

metric stations. Eventually, however, we shall undoubtedly be able to restrict this publication somewhat and follow out Margules: "If for certain special investigations a finer network of barometric stations is desired they certainly can be easily established, and then dissolved at the close of the work".

Hitherto the Weather Bureau has not attempted to forecast thunderstorms, hailstorms, and tornadoes, but if ever we should do this for special localities, such as our large cities, we should certainly need a much closer network of barometric stations than at present.

THUNDERSTORMS, LIGHTNING, AND HAIL.

The observations of thunderstorms and hail in upper Austria, during the year 1904, have been summarized by Prof. R. Prohaska. The total number of stations was 426, and the number of reports 17,850 thunderstorms, with 1578 additional reports of distant lightning or heat lightning. The average number of thunderstorms per station was 42.7 for the year 1904, being the highest since the series of reports began. The next highest was 37.9 in 1889; the lowest was 27.0 in 1900 and also in 1902. The regular registration of hail began in 1888; the average number of hailstorms per station during the fourteen years was 2.3; the maximum number was 3.6 for this same year, 1904. Hailstorms occur in long narrow streaks; out of 46 cases that were examined the length of the streak varied between twenty and two hundred kilometers, while the average width was from five to fifteen kilometers. The fronts of the hailstorms advanced with an average velocity of from thirty to forty-five kilometers per hour. Hailstones having large diameters occurred as follows:

Diameters—centimeters.	Frequency—days.
$\frac{1}{2}$	18
1.....	24
2.....	12
3.....	6
4.....	4
5.....	4
7.....	3
8.....	2
10.....	1

As ten centimeters is practically the same as four inches, the reader will see that the agriculturists of Austria probably suffer more from hail than those of the United States.

With regard to lightning strokes Prohaska states that an unusual number of strokes, viz, 807, were reported in 1904, of which 95 related to injuries to persons, 115 to domestic animals, 179 to trees, 177 to buildings set on fire by the lightning, 114 to the so-called "cold strokes", which injure, but do not set the buildings on fire, and 127 miscellaneous.

GENERAL INDEX.

Doctor Forster, librarian of the Centralanstalt, publishes a general register of the contents of the annual Jahrbucher of the Centralanstalt for the years 1864-1903. This occupies only six pages, but will be continually referred to by those who need to use the data contained in these volumes. We hope that every other national weather bureau will publish similar registers.—C. A.

MOUNTAIN STATIONS FOR FORECAST WORK.

The study by Mr. McLeod and Professor Barnes published on a previous page is analogous to those made by myself in my efforts to utilize the observations made on Mount Washington in daily forecast work. That station was maintained for seventeen years, and during the latter part of this period at my earnest request, since I was frequently able to forecast weather changes by means of observations telegraphed daily from the summit. Eventually, however, the station was discontinued, as the cost seemed to be not fully compensated by the value of the work. Professor Hazen condensed the records as to temperature and pressure into a series of graphic dia-

grams, and copies of these for the months of January, February, and March, for the years 1871-1886, were published in the MONTHLY WEATHER REVIEW for July, August, September, and October, 1891, with a few words of explanatory text on pages 171 of the July REVIEW and 250 of the October REVIEW. This was done in connection with a long discussion distributed thru various meteorological journals on the question whether the air temperature in areas of low pressure is higher or lower than in areas of high pressure, and the diagrams contributed somewhat to modify our ideas on that subject. The lag of the temperature changes in the lower strata behind those in the upper strata, which had been inferred by me from the early years of our work, does not appear so plain when we take the whole series into consideration.

In the MONTHLY WEATHER REVIEW, October, 1891, page 250, Professor Hazen says:

As has been noted before, the most marked characteristic in the temperature curves has been their closeness at base and summit, indicating, apparently, a general effect not essentially modified by local causes. The earlier change at the summit in both cold waves and hot waves is remarkable, and does not seem to be due, as has been suggested, to the greater rapidity of the upper current which carries the warm or cold air from the west more rapidly to the summit than to the base. It will be seen that any effect of this kind would be very quickly obliterated by the motion of the air. Again, while on some accounts warm air from the earth's surface might produce such an effect, it would seem that cold air could not have this source, but must come from above.

Professor Hazen's diagrams give us not the actual temperatures, but the temperatures corrected for average diurnal range, and it is very desirable that a renewed study of these valuable data be made from Professor Barnes's point of view. This and many other studies could be carried out if the observations at summit and base were published in full, as has been done for Pikes Peak.—C. A.

WEATHER BUREAU MEN AS EDUCATORS.

Classes from high schools and academies have visited Weather Bureau offices, to study the instruments and equipment and receive informal instruction, as reported from the following offices:

Columbus, Ohio, November 16, 1906, a class from the South High School.

Mobile, Ala., October 12, and November 21 and 27, 1906, classes from Barton Academy.

Pensacola, Fla., October 19, 1906, scholars from High School No. 1.

Spokane, Wash., November 7, 8, 9, and 13, 1906, the physical geography class of the Spokane High School, in sections.

MONTHLY REVIEW OF THE PROGRESS OF CLIMATOLOGY THRUOUT THE WORLD.

C. FITZHUGH TALMAN, U. S. Weather Bureau.

METEOROLOGICAL STATIONS IN HAITI.

The accompanying chart, fig. 1, shows the location of all meteorological stations now in operation in Haiti. This chart has been corrected, in the manuscript, by Prof. Josef Scherer, of the Collège St. Martial, Port au Prince, whose labors in behalf of Haitian meteorology are well known to many readers of the REVIEW. All the stations shown on the chart, except one, report their observations to Professor Scherer, who publishes them regularly in his "*Bulletin mensuel de la Station Météorologique de Port au Prince, Haiti*". The elaborate observations made at the central observatory, Port au Prince, are published also in the Jahrbuch of the Centralanstalt für Meteorologie, Vienna, and in the Annales du Bureau Central Météorologique de France.

The climate of Port au Prince has been quite fully investigated by Scherer and Hann, and a large body of normals for this station now exists. (See the Anhang to the Vienna Jahrbuch for 1893; Meteorologische Zeitschrift, March, 1897,

pp. 116-119; and *ibid.*, May, 1906, pp. 220-222.) The other stations are of comparatively recent origin; but normal monthly values of the rainfall at Port Margot, Gonaïves, Ganthier, and Pétionville are published in Professor Scherer's monthly bulletin.

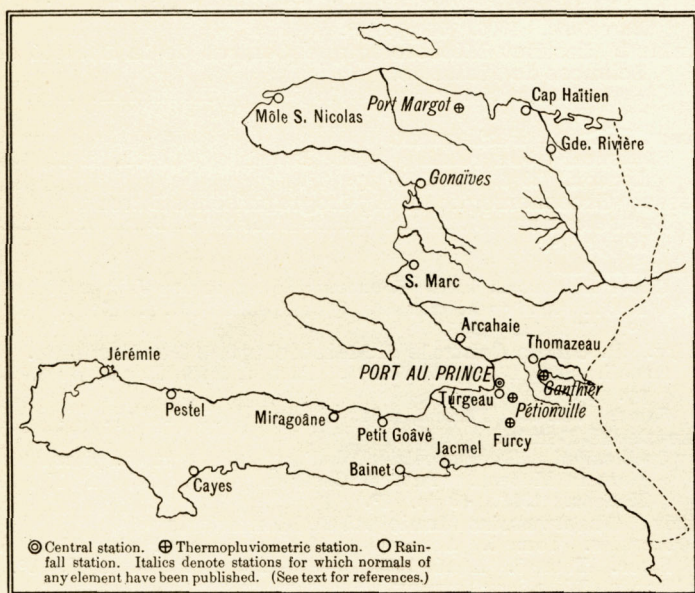


FIG 1.—Meteorological stations in Haiti.

As few particulars have hitherto been published concerning Professor Scherer's observatory at Port au Prince, which has long been regarded as one of the fundamental meteorological stations within the Tropics, the following inventory of its instrumental equipment is here presented, together with a photograph of the station (fig. 2).

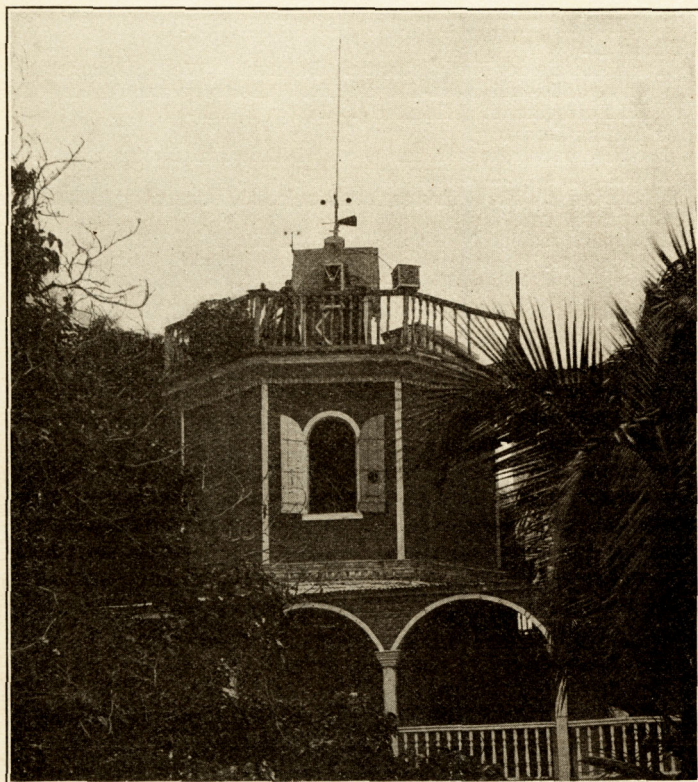


FIG. 2.—Meteorological observatory of the Collège St. Martial, Port au Prince, Haiti.

Instruments in use with which observations are regularly made.

Atmospheric pressure: Standard barometer for comparison; barometer for observation; two Richard barographs.

Temperature: Maximum and minimum thermometers, properly sheltered; thermometers to record temperature of the ground at 40 cm. and 1000 cm. depth; actinometer, white and black bulbs; registering maximum thermometer for direct rays of the sun.

Humidity: Psychrometer (dry and wet bulb); psychrometer (aspiration); Richard's hygograph.

Evaporation: Evaporimeter (Piche, imbibition); evaporimeter (Wild, free surface).

Wind: Recording anemometer, electrically controlled; Wild anemometer, electrically controlled, registering every ten minutes.

Sunshine and clouds: Direct observations at stated intervals; nephoscope; sunshine recorder.

Rainfall: Various rain gages.

Seismic phenomena: Seismograph; seismometer; microseismograph.

Tides: Mareograph.

Astronomical: Meridian circle, transit, etc., for determination of time.

The station Furcy, shown on our chart south of Port au Prince, is a mountain resort (altitude 1540 meters or 5053 feet), at which observations are made only during the summer months. These are published *in extenso* by Professor Scherer.

In 1905 an "astronomical and meteorological society" was organized in Port au Prince, whose station established in that city is independent of the central observatory of the Collège St. Martial. This new station is under the direction of Brother F. Constantine, of the Institution of St. Louis de Gonzales, which society also has a station at Turgeau, a suburb of Port au Prince, and publishes the observations of both its stations in a monthly bulletin.

CLIMATOLOGY OF LIBERIA.

Exact measurements of meteorological phenomena in Liberia have but recently begun.¹ A good description of the climate of this country, by J. Büttikofer, was published in *Verhandlungen der Gesellschaft für Erdkunde zu Berlin*, Bd. 17, 1890, pp. 60-63, but this dealt only in generalities, containing no statistics in numerical form.

In a paper read before the Royal Geographical Society, and published in the *Geographical Journal* of August, 1905, Sir Harry Johnston reported that two English companies, in conjunction with the Government of Liberia, were endeavoring to accumulate knowledge regarding the productions and climate, and had begun to keep records of the rainfall. The same paper gave a sketch of the climate, based largely upon the author's personal experience.

The most extensive account of the climate of Liberia that has yet appeared, however, and the first so far as the present writer is aware, to include numerical data for definite stations, appears in Sir Harry Johnston's monumental work *Liberia*, recently published (New York: Dodd, Mead, & Co., 1906). Chapter 20, of Volume I, is entitled "Climate and Rainfall", and brings out some interesting facts on these subjects. The observations quoted were made in 1904 and 1905, and refer to temperature and rainfall.

Some of the stations record a wide range of temperature during the dry months, December, January, and February. At Sikombe temperatures of 105° and 56° F. were observed in the same month, February, 1905. The former is the highest shade temperature hitherto recorded in Liberia. The annual rainfall of the coast regions of western Liberia appears to be about 150 inches; behind the forest region, on the Mandingo plateau, it does not exceed 60 to 70 inches.

A SKETCH OF THE CLIMATE OF NEBRASKA.

Prof. George Evert Condra, of the University of Nebraska, has recently published a little volume, adapted for use in

¹ In 1878 (?) two young men visited Washington on their way to Liberia, where they expected to teach in some college. They were urged to keep meteorological records and did, soon afterwards, while in Edinburgh, secure all necessary apparatus, but we never received any reports from them.—C. A.

schools, entitled "Geography of Nebraska".² Chapter 5 of this work is a sketch, in clear and simple language, of the average and typical climatic features of the State, with a rainfall chart, and a little photogravure entitled "Typical Snow Scene in Nebraska". The latter is noteworthy; pictures have been heretofore little used in climatological literature, though their importance is generally recognized in other branches of science.

RAINFALL OF THE NETHERLANDS.

A discussion of the rainfall of the Netherlands, by A. J. Monné, recently published in instalments in *Hemel en Dampkring*, has been reprinted as a separate pamphlet.³ In this work the author summarizes the results obtained at the stations of the Royal Netherlands Meteorological Institute down to 1900. The longest records extend back to 1845. Both normal and extreme values of the rainfall at the several stations are set forth in the tables, and a chart shows the average distribution of the annual fall over the kingdom for the period 1886-1900.

RAINFALL OF BELIZE.

A recent Colonial Report for British Honduras (Annual No. 455) gives the average rainfall at Belize for the twenty-two years 1883-1904 as 80.8 inches. This is slightly higher than the 12-year average given in Supan's "Verteilung des Niederschlags". The greatest annual rainfall is given as 114.12 inches in 1900; the least, 55.29 inches in 1893.

RAINFALL OF HERMSBURG, AUSTRIA.

Hermsburg, which is situated on the south side of the Krainer Schneeberg, in Carniola, enjoys the reputation of being one of the wettest spots in the North Temperate Zone. The only stations in continental Europe having a heavier rainfall lie in the mountains of Montenegro, back of the Bay of Cattaro.

Doctor Hann publishes a rainfall table for Hermsburg in the *Meteorologische Zeitschrift* for October, 1906, from which it appears that this station had a mean annual rainfall of 3069 mm. (120.82 inches) during the nineteen years, 1887-1905. The wettest year was 1889, with 4458 mm. (175.52 inches).

RAINFALL OF GAMBAGA, GOLD COAST COLONY.

While stations on the Guinea coast, owing to their proximity to the equator, have two wet and two dry seasons in the year, stations lying a few hundred miles inland from this coast have but one wet and one dry season. At Gambaga, in the northernmost part of the Gold Coast Colony, (approximate latitude 10° 45' north), the distribution of rainfall in inches, thru the year 1904, as published in Colonial Reports—Annual No. 457 (London, 1905,) was as follows: January, 0.00; February, 0.00; March, 0.16; April, 1.74; May, 6.65; June, 3.19; July, 10.01; August, 7.25; September, 7.97; October, 3.09; November, 0.00; December, 0.00. Total for the year, 40.06.

RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

H. H. KIMBALL, Librarian.

The following titles have been selected from among the books recently received, as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies. Most of them can be loaned for a limited time to officials and employees who make application for them.

Athens. Observatoire National.

Annales. Tome 4. Athènes. 1906. 577, [2] pp. f°.

²Condra, George Evert. *Geography of Nebraska*. Lincoln, Nebr.: University Pub. Co., 1906.

³Monné, A. J. *Neerslag in het Koninkrijk der Nederlanden*. 's-Gravenhage, 1905.

Christie, W[illiam] H[enry] M[ahoney].

Temperature of the air as determined from the observations and records of the fifteen years, 1891 to 1905, made at the Royal Observatory, Greenwich. (Reduction of Greenwich meteorological observations, Part 4.) Edinburgh. 1906. 67 pp. f°.

Cirera, R.

Notice sur l'Observatoire et sur quelques observations de l'éclipse du 30 Août 1905. (Mémoires de l'Observatoire de l'Ebre. No. 1.) Barcelone. 1906. 56 pp. f°.

Finland. Institut Météorologique Central de la Société des Sciences de Finlande.

Observations météorologiques. 1895-1896. Helsingfors. 1906. 129 pp. f°.

Great Britain. Parliament.

Statistical tables relating to the British colonies... Pt. 29, 1904. London. 1906. [22], 887 pp. f°.

Hesse. Grossherzogliches Hydrographisches Bureau.

Deutsches meteorologisches Jahrbuch für 1905. Darmstadt. 1906. 75 pp. f°.

Holm, Ragna.

Ueber die abnorm kleine Sonnenstrahlung in den Jahren 1902 und 1903... (Arkiv matem. astro. fys., Upsala. Bd. 2. No. 4.) 6 pp. 8°. [Upsala. 1905.]

Italy. R. Ufficio Centrale di Meteorologia e Geodinamica.

Annali. Serie seconda. Vol. 15. Parte 2, 1893. Roma. 1906. 365 pp. f°.

Same. Vol. 16. Parte 3, 1894. Roma. 1906. 363 pp. f°.

Pantanelli, Dante.

Oscillazioni nella composizione dell'acqua del pozzo di piazza maggiore in Modena. (Pub. R. Osserva. geofis. Modena. No. 18.) Modena. 1906. 10 pp. f°.

Paris. Observatoire Municipal de Montsouris.

Annales. Tome 5. Année 1904. 3-4 fascicule. Paris. 1904. 8°.

Same. Tome 5. Année 1905. 1-4 fascicule. Paris. 1905. 8°.

Philippine Weather Bureau.

Annual report for 1904. Parts 1 and 2. Manila. 1906. 208 pp. 4°.

Prussia. Königliches Preussisches Aeronautisches Observatorium bei Lindenberg.

Ergebnisse der Arbeiten... 1905. 1 Band. Braunschweig. 1906. xxix, 144 pp. 14 tables.

Prussia. Meteorologisches Institut.

Deutsches meteorologisches Jahrbuch für 1905. Heft 1. Berlin. 1906. 38 pp. f°.

Royal Geographical Society.

General index to the first 20 volumes of the Geographical Journal. London. 1906. [27], 629 pp. 8°.

Scharf, Edmund.

Der Hagel. Halle a S. 1906. vi, 195 pp. 12°.

Schück, A.

Zur Kenntnis der Wirbelstürme. Bahnan. (Westindien, Indischer Ozean, Süd- und Nord-Ost Pacific.) (Beiträge zur Meereskunde. III Fortsetzung.) Hamburg. 1906. Pp. 49-83. f°.

Voss, Ernst Ludwig.

Die Niederschlagsverhältnisse von Südamerika. Inaug.-diss... Rostock. Rostock. 1905. 35 pp. f°.

Württemberg. K. Württembergisches Meteorologisches Zentralstation.

Deutsches meteorologisches Jahrbuch für 1904. Stuttgart. 1906. 64 pp. f°.

RECENT PAPERS BEARING ON METEOROLOGY.

H. H. KIMBALL, Librarian.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a —

Bulletin of the American Geographical Society. New York. Vol. 38. Nov., 1906.

Huntington, Ellsworth. The vale of Kashmir. [Part II.—The climate of the past. Pp. 668-682.]

Bulletin of the Geographic Society of Chicago. Chicago. No. 3. 1906.

Cox, Henry J. and Goode, J. Paul. (Ed.) Lantern slide illustrations for the teaching of meteorology. Pp. 1-130.

Journal of Geography. New York. Vol. 5. Oct., 1906.

Ward, Robert DeC[ourcy]. The characteristics of the zones. II.—The temperate zones. Pp. 337-353.